



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup> :</b>  <b>F16B 37/06</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 93/00517</b>  <b>(43) International Publication Date:</b> 7 January 1993 (07.01.93)
<b>(21) International Application Number:</b> PCT/SE92/00419 <b>(22) International Filing Date:</b> 15 June 1992 (15.06.92)  <b>(30) Priority data:</b> 9102006-5                      28 June 1991 (28.06.91)                      SE  <b>(71) Applicant (for all designated States except US):</b> AB VOLVO [SE/SE]; S-405 08 Göteborg (SE).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only) :</b> STILLBÄCK, Ola [SE/ SE]; Berghöjdgatan 18, S-422 49 Hisingsbacka (SE). LINDAHL, Lars [SE/SE]; Solvändan 12, S-439 00 On- sala (SE).  <b>(74) Agent:</b> AWAPATENT AB; Box 53252, S-400 16 Göteborg (SE).		<b>(81) Designated States:</b> AT, AU, BB, BG, BR, CA, CH, CS, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, PL, RO, RU, SD, SE, US, Euro- pean patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>
<b>(54) Title:</b> ELECTRICAL CONTACT NUT  <div style="text-align: center;"> </div>		
<b>(57) Abstract</b>  <p>The invention concerns an electrical contact nut (1) primarily intended to be welded to a sheet steel component (8) of a motor vehicle, and comprising a first, preferably cylindrical portion (2) and a second, wider portion (3) at one end of the first portion (2). On its side facing the first portion (2), the second portion (3) is provided with an annular member (4) of a weldable material. By means of its first portion (2), the nut (1) may be introduced into an aperture (7) formed in the sheet metal component (8) until the annular welding member (4) abuts against the sheet metal component (8). In this position, the nut may be welded to the component (8).</p>		

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ELECTRICAL CONTACT NUT

5       The subject invention concerns an electrical contact  
nut designed to be welded onto a sheet metal component,  
primarily onto motor vehicle sheet steel components. The  
nut comprises a first, preferably cylindrical portion and  
a second portion with larger width dimensions than the  
10 first portion.

Electrical contact nuts of this kind are used above  
all within the automobile industry. The nut is applied in  
alignment with an aperture formed in the vehicle body, and  
on the opposite side of the sheet steel a cable socket is  
15 attached to the sheet metal in alignment with the  
aperture, with the aid of a screw-threaded bolt having a  
head thereon, which bolt is screwed onto the nut. In this  
manner an earth connection point is provided in the  
vehicle body.

20       This prior-art technology suffers from several  
drawbacks. When the nut is welded to the sheet metal  
component, care must be taken to ensure that the nut is  
maintained in an exact position in alignment with the  
aperture, or else it becomes impossible to screw the bolt  
25 into the nut. In addition, it is necessary that the sheet  
metal side opposite the nut side exhibits a smooth and  
even surface in order to allow satisfactory earth  
connection to be established. However, the smoothness of  
the surface also means that the cable socket mounted at  
30 the end of a cable to be secured to the sheet metal  
component tends to co-rotate with the bolt as the latter  
is tightened, and consequently some kind of immobilizing  
force must be exerted on the socket, which complicates the  
mounting operation.

35       Should the nut for some reason loosen with respect  
to the sheet metal and for that reason fall off, for

instance in connection with untightening of the connection in order to replace the cable, it may be difficult to weld on a fresh nut, since the latter has to be applied on the side of the sheet metal component that from the

5 assembler's point of view is the reverse or inner side of the sheet metal component. Another complication is that it may be difficult to dissociate the bolt from the loose nut because of the co-rotation of the latter while at the same time access to the nut is difficult.

10 With the advent of the electrical contact nut in accordance with the subject invention the drawbacks outlined in the foregoing are eliminated. The features characterizing the invention are defined in the appended claims.

15 The invention will be described in closer detail in the following with reference to the accompanying drawing figures, in which:

Fig. 1 is a sectional view through a sheet metal component including an earth connection point embodying  
20 the electrical contact nut in accordance with the invention, and

Fig. 2 illustrates the electrical contact nut welded to the sheet metal component in an alternative manner.

The electrical contact nut 1 comprises a first,  
25 preferably cylindrical portion 2, and a second, likewise preferably cylindrical portion 3 which is formed integral with the first portion 2 but is wider than the latter. On its side facing the first portion 2, the second portion 3 is provided with an annular member 4 of a weldable  
30 material. On its opposite side 5, the second portion 3 is formed with studs 6, the function of which will be explained in the following.

The first portion 2 of the electrical contact nut 1 is arranged to be pushed into an aperture 7 formed in a  
35 sheet metal component 8, which may be a motor vehicle sheet metal component, sufficiently far for the annular

welding member 4 to abut against the sheet metal 8. In this position, the nut 1 is welded firmly to the sheet metal component 8 and once this welding operation is completed, a reliable earth connection has been  
5 established.

To mount a cable 9 provided with a cable socket 10, the latter is screwed onto the nut 1 with the aid of a threaded bolt 11 which is threaded into the nut 1, a flange 12 on said nut pressing said cable socket 10  
10 against the studs 6 formed on the front or external side 5 of the nut 1. The studs 6 penetrate into the material of the cable socket 10, preventing the latter from co-rotating with the bolt 11 when the latter is tightened.

By means of the electrical contact nut in accordance  
15 with the invention the drawbacks referred to in the foregoing and found in prior-art electrical contact nuts are removed. The nut 1 is easily introduced into the aperture 7, in which it is maintained in position while being welded to the sheet metal component 8. There is no  
20 need for any position-retaining measures of any kind, in contrast to what is the case, when the nut 1 is applied against the sheet metal component 8 on the opposite side thereof. In addition, and as explained in the foregoing, the studs 6 prevent the cable socket 10 from co-rotating  
25 with the bolt 11 when the latter is tightened, a phenomenon otherwise occurring when the cable socket 10 must be applied against the surface of the sheet metal component 8, which is painted.

In the event that, for instance as a result of  
30 vibrations in the sheet metal component 8, the nut 1 loses its grip on the latter, it will not fall off, when the bolt is loosened but will remain inside the aperture 7, and in the manner illustrated in Fig. 2 it may be re-attached to the component 8 in a simple manner by means of  
35 a fresh welding joint 13.

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The electrical contact nut 1 in accordance with the invention is not limited to the embodiment illustrated and described herein but may be varied in many ways within the scope of the appended claims. This applies both to the configuration of the nut 1 itself and to the type of frictional means formed on its outer face 5.

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CLAIMS

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1. An electrical contact nut intended to be welded to a sheet metal component (8), preferably a sheet metal component of a motor vehicle, and comprising a first, preferably cylindrical portion (2) and a second portion  
10 (3) having larger width dimension than the first portion (2), characterized in that the wider portion (3) of the nut (1) is formed on its side facing the first portion (2), with an annular member (4) of a weldable material, and in that by means of its said first  
15 portion (2) the nut (1) may be introduced into an aperture (7) formed in the sheet metal component (8) sufficiently far for said annular welding member (4) to abut against the sheet metal component (8), in which position the nut (1) may be welded to said sheet metal component (8).

20 2. An electrical contact nut as claimed in claim 1, characterized in that on its upper or front side (5), which is the side on the second nut portion (3) that corresponds to the one opposite the annular welding member (4), the nut (1) is provided with means (6)  
25 designed to increase the friction against a component, such as a cable socket (10), mounted on said upper or front side (5).

3. An electrical contact nut as claimed in claim 2, characterized in that said means are studs  
30 (6) projecting from said upper or front side (5).

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Fig. 1

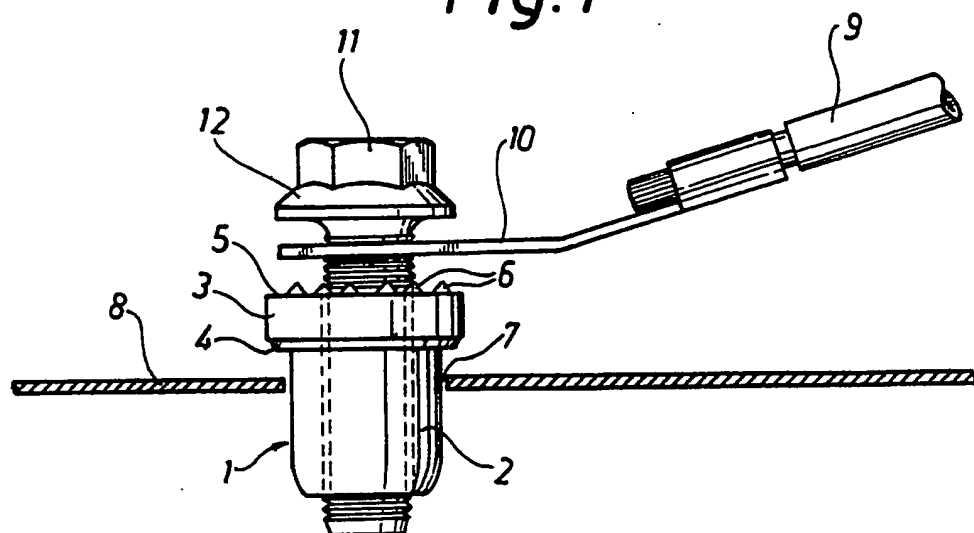
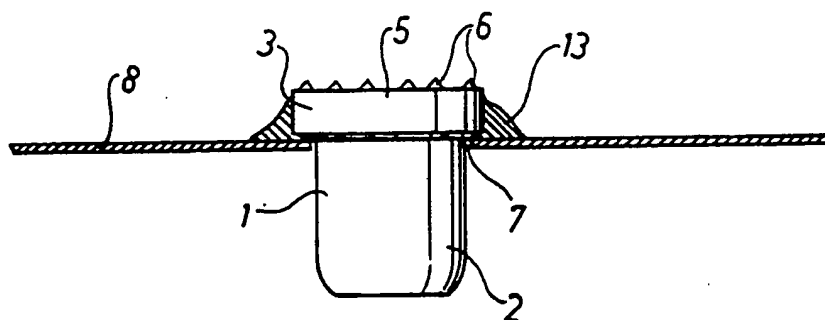


Fig. 2





# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00419

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <b>IPC5: F 16 B 37/06</b>																				
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched<sup>7</sup></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="height: 40px; vertical-align: bottom;">IPC5</td> <td style="vertical-align: bottom;">F 16 B</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched<sup>8</sup></div> <p>SE,DK,FI,NO classes as above</p>			Classification System	Classification Symbols	IPC5	F 16 B														
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IPC5	F 16 B																			
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category *</th> <th style="border-bottom: 1px solid black;">Citation of Document,<sup>11</sup> with indication, where appropriate, of the relevant passages<sup>12</sup></th> <th style="width: 10%; border-bottom: 1px solid black;">Relevant to Claim No.<sup>13</sup></th> </tr> <tr> <td style="vertical-align: top;">X</td> <td>GB, A, 2151324 (DAIMLER-BENZ AKTIENGESELLSCHAFT) 17 July 1985, see abstract; figures 1-2</td> <td style="vertical-align: top;">1</td> </tr> <tr> <td style="vertical-align: top;">Y</td> <td style="text-align: center;">--</td> <td style="vertical-align: top;">2,3</td> </tr> <tr> <td style="vertical-align: top;">Y</td> <td>GB, A, 2120346 (HAN-CHEN CHANG ET AL) 30 November 1983, see page 1, line 30 - line 41; figure 1</td> <td style="vertical-align: top;">2,3</td> </tr> <tr> <td style="vertical-align: top;">A</td> <td>DE, A1, 3102939 (SPRINGFIX BEFESTIGUNGSTECHNIK GMBH) 2 September 1982, see figures 1-4 see page 7, second part - page 9, first part</td> <td style="vertical-align: top;">1-3</td> </tr> <tr> <td></td> <td style="text-align: center;">-----</td> <td></td> </tr> </table>			Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>	X	GB, A, 2151324 (DAIMLER-BENZ AKTIENGESELLSCHAFT) 17 July 1985, see abstract; figures 1-2	1	Y	--	2,3	Y	GB, A, 2120346 (HAN-CHEN CHANG ET AL) 30 November 1983, see page 1, line 30 - line 41; figure 1	2,3	A	DE, A1, 3102939 (SPRINGFIX BEFESTIGUNGSTECHNIK GMBH) 2 September 1982, see figures 1-4 see page 7, second part - page 9, first part	1-3		-----	
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>* Special categories of cited documents:<sup>10</sup></b></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>																				
<b>IV. CERTIFICATION</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border-bottom: 1px solid black;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="height: 40px; vertical-align: bottom;">26th August 1992</td> <td style="vertical-align: bottom; text-align: center;">17 -09- 1992</td> </tr> <tr> <td style="border-bottom: 1px solid black;">International Searching Authority</td> <td style="border-bottom: 1px solid black;">Signature of Authorized Officer</td> </tr> <tr> <td style="text-align: center; vertical-align: bottom;"> <b>SWEDISH PATENT OFFICE</b>  <small>Form PCT/ISA/210 (second sheet) (January 1985)</small> </td> <td style="text-align: center; vertical-align: bottom;">   <b>Jesper Stenström</b> </td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	26th August 1992	17 -09- 1992	International Searching Authority	Signature of Authorized Officer	<b>SWEDISH PATENT OFFICE</b> <small>Form PCT/ISA/210 (second sheet) (January 1985)</small>	 <b>Jesper Stenström</b>										
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 92/00419**

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
GB-A- 2151324	85-07-17	DE-C-	3345617	85-01-10
		FR-A-B-	2560943	85-09-13
		JP-C-	1623968	91-11-18
		JP-B-	2047064	90-10-18
		JP-A-	60140679	85-07-25
		US-A-	4650274	87-03-17
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GB-A- 2120346	83-11-30	NONE		
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DE-A1- 3102939	82-09-02	EP-A-	0071615	83-02-16
		JP-A-	57144307	82-09-06
		WO-A-	82/02579	82-08-05